

a third species of *Neohumbertiella* was described (HOCHREUTINER, 1949) and an additional variety (HOCHREUTINER, 1955).

HUTCHINSON (1967) placed *Neohumbertiella* in synonymy under *Humbertiella* without comment. He wrote that *Humbertiella* consisted of four to five species, but he made none of the necessary combinations. Recently, difficulty in distinguishing material of *Humbertiella* from that of *Neohumbertiella* led to a re-examination of the relationship between the two genera and the similar conclusion, argued here, that they are congeneric.

A number of characters justify uniting *Humbertiella* and *Neohumbertiella*. The staminal column in both genera is terminated at the apex by five teeth that in several species have become elaborated to such a degree that HOCHREUTINER (1940) called the collective structure a "coronule". This "coronule" is not well-developed in *H. quararibeoides* or *H. henrici*. However, it is conspicuous in *H. decaryi*, *H. decaryi* var. *sakarahensis*, and *H. tormeyi* and relatively elaborate in *H. foliosa* and *H. sakamaliensis*. The "coronule" of HOCHREUTINER is undoubtedly homologous to the five minute teeth at the apex of the staminal column that are found in the *Hibisceae* Reichb., *Gossypieae* Alef., *Malvavisceae* K. Presl, and *Decaschistieae* Fryxell (all *Malvaceae*) (BORSSUM WAALKES, 1966; FRYXELL, 1975, 1988).

The stamens of all species included in *Humbertiella* are grouped near the apex of the staminal column. The stamens are in either 2 or 3 well-developed whorls (*H. sakamaliensis* and *H. henrici*, respectively), no discernible whorl (*H. decaryi*), or in 2 weakly-developed whorls (the remaining species). *Humbertiella quararibeoides* has 10 and all the other species have 15 stamens. The anthers are either sessile, subsessile or they possess conspicuous filaments. Also, contrary to earlier interpretations (HOCHREUTINER, 1926a, 1932, 1940; PERRIER DE LA BÂTHIE & HOCHREUTINER, 1955), anthers in both *Humbertiella* and *Neohumbertiella* are monothecal. Free-hand cross-sections through the anthers of flower buds of *H. quararibeoides* reveal a single cell. Each theca is indented on its outer surface and after dehiscence, which is protandrous, there is a longitudinal ridge along the internal surface indicating that the theca may have been derived from a two-celled structure. None the less, there is no evidence of a septum dividing the anther cells which are clearly monothecal.

In both *Humbertiella* and *Neohumbertiella* the anther connective is a swollen, cushion-like structure that is often purple in color when dry. This type of connective also occurs in *Megistostegium* Hochr. (*Malvaceae*), another genus endemic to Madagascar. (*Megistostegium* can be distinguished readily from *Humbertiella* by its large, petaloid involucellar bracts and greatly reduced calyx). The distribution and importance of this type of anther connective in the *Malvaceae* is not known.

Palynologically there are no significant differences between *Humbertiella* and *Neohumbertiella*. Both genera have pollen that is characteristically malvaceous, i.e., spheroidal and echinate. PRESTING et al. (1983) provided descriptions of the pollen of *H. decaryi* (cited as *N. decaryi*), *H. sakamaliensis* (cited as *N. sakamaliensis*), and *H. quararibeoides*. All three species have fairly large (ca. 60-80  $\mu$ m) eumonads that are spheroidal, polypantoporate with 20-30 pores, and echinate with 50 or more monomorphic spines that are ca. 10-20  $\mu$ m long.

Fruit characters are the most striking characters uniting *Humbertiella* and *Neohumbertiella*. All species have a membranaceous, accrescent calyx subtending the mature carpels. Typically the mature calyx is flattened and serves to display the fruit. (The calyx of *Holmskioldia* Retz., *Verbenaceae*, a genus that also occurs in southern Madagascar, is membranaceous and superficially similar to that of *Humbertiella*, but in fruit *Holmskioldia* is



quickly recognized by the opposite phyllotaxy). In *H. foliosa* the mature calyx is erect and conceals the fruit.

The fruit in *Humbertiella* and *Neohumbertiella* first dehisces septicidally (except in *H. quararibeoides*) and then loculicidally. The carpels do not separate from each other completely. However, when the carpels are teased apart one finds well-developed vascular bundles that extend from the columella and that are located between and are continuous with adjacent carpels. These vascular bundles look like the handle on a tea cup and are found in all of the species except *H. quararibeoides*. The carpels are more tightly connate in *H. quararibeoides* than in other species and presumably the wing-like vascular projections have become fused to the carpel walls. Loculicidal dehiscence begins at the apex near the columella, but it is never complete. All species of *Humbertiella* are monospermous and the seeds are reniform and pendulous with the radicle uppermost.

In summary, the characters that unite *Humbertiella* and *Neohumbertiella* are the following : shrubby habit; involucre subtending the calyx; gamosepalous calyx that becomes membranaceous and accrescent in fruit; petals united at their bases with the staminal column and caducous with the latter structure; development of a "coronule" or elaboration of the five teeth at the apex of the staminal column; relatively small and determinate number of stamens; stamens restricted to the apex of the staminal column; unilocular anthers; swollen cushion-like anther connectives; spheroidal and echinate pollen; single ovule per locule; and fruit with carpels that dehisce septicidally first and then loculicidally, the fruit sometimes separating to reveal between adjacent carpels wing-like vascular projections from the columella.

Although the distinction between the *Malvaceae* and *Bombacaceae* is probably artificial (BORSSUM WAALKES, 1966; see FRYXELL, 1968, for an opposing view) the characters uniting *Humbertiella* and *Neohumbertiella* and especially the unilocular (versus bi- or multilocular) anthers and echinate (versus smooth) pollen indicate that *Humbertiella* belongs in the *Malvaceae* sensu stricto and not in the *Bombacaceae*. Thus HUTCHINSON's (1967) familial classification is followed here rather than that of HOCHREUTINER (1932, 1949) and PERRIER DE LA BÂTHIE & HOCHREUTINER (1955) who placed *Humbertiella* in the *Bombacaceae*, or that of EDLIN (1935a) who misinterpreted the morphology of *Humbertiella* (he confused the "coronule" with staminodes) and placed *Humbertiella* near *Dombeya* Cav. in the *Sterculiaceae* (cited as *Buettneriaceae* [sic]).

HOCHREUTINER (1955) who considered *Neohumbertiella* to be distinct from *Humbertiella* placed the former genus in the *Hibisceae*. Similarly, HUTCHINSON (1967) who united the two genera placed *Humbertiella* in the *Hibisceae*. Nevertheless, the tribal placement of *Humbertiella* is problematic. Fruit morphology is important in the taxonomic delimitation of tribes and genera in the *Malvaceae* (FRYXELL, 1975) and the fruit of *Humbertiella* does not agree with that of the *Hibisceae*. In the *Hibisceae* dehiscence is loculicidal and the fruit is a unitary structure or capsule in which the carpel walls remain attached to the central column. In *Humbertiella* the fruit is septicidally dehiscent at first (albeit this is suppressed in *H. quararibeoides*) and then incompletely loculicidally dehiscent. In many respects, the fruit of *Humbertiella* resembles that of the *Malvaceae* that has septicidally dehiscent mericarps.

Despite similarities in fruit, *Humbertiella* fundamentally differs from the *Malvaceae* with respect to style and stigma number. In the *Malvaceae*, flowers have 10 free styles and 5 mericarps per fruit. It is the only tribe in which the flowers have twice as many stigmas as



mericarps. *Humbertiella* has 3-5 free or partially united styles and 3-5 carpels per fruit. It is thus more similar to the other tribes of *Malvaceae* in which the flowers have an equal number of stigmas and carpels.

An additional character separating *Humbertiella* from both the *Hibisceae* and *Malvavisceae* is ovule position. The ovules of *Humbertiella* are pendulous. Those of the *Malvavisceae* and *Kosteletzkya* K. Presl, which is otherwise the sole uniovulate genus of the *Hibisceae*, are ascending. The reduction in number of carpels to 3 in *H. quararibeoides* is anomalous in the *Malvavisceae* and *Hibisceae*. Both tribes invariably have 5 carpels and clearly *Humbertiella* also normally has 5 carpels. The disposition of stamens in separate whorls tends to be more common in genera such as *Pavonia* Cav. and *Peltaea* (K. Presl) Standley (both *Malvavisceae*) than in *Hibiscus* L., but this can only be a supporting character in ascertaining tribal affinities.

Since *Humbertiella* can not be accommodated within either the *Hibisceae* or *Malvavisceae* without radically altering the circumscription of these tribes and since none of the other tribes presently recognized can accommodate *Humbertiella* it appears best to leave the genus *incertae sedis*. It may be that a new tribe will have to be erected to accommodate *Humbertiella*, but such a proposal would be premature given that the genera of *Malvaceae* endemic to Madagascar are in need of a critical review.

#### HUMBERTIELLA Hochr.

Candollea 3 : 3, *tab. 1* (1926); Compt. Rend. Acad. Sci., Paris 182 : 1485 (1926); Candollea 5 : 1 (1932); H. PERRIER & HOCHR., Fl. Madag. 130 : 17 (1955).

*Neohumbertiella* HOCHR., Candollea 8 : 27, *tab. 1* (1940); Fl. Madag. 129 : 112 (1955). Type : *N. decaryi* Hochr. = *Humbertiella decaryi* (Hochr.) Dorr.

Shrubs or small trees to 8 m tall. Leaves, petioles, stipules, pedicels, peduncles, calyx in flower, and carpels in fruit generally densely stellate-pubescent. Leaves borne on short shoots, scattered along the branches, or clustered at the branch tips. Stipules caducous.

Flowers solitary in axils of subtending leaves or inflorescences axillary, 2-many-flowered corymbs. Involucellar bracts 5-10 (-11), free or united, minute to 1.2 cm long. Calyx gamosepalous, ca. one-third to one-half divided, becoming membranaceous and accrescent in fruit. Petals membranaceous, pellucid, scarcely to conspicuously exceeding the calyx in length. Staminal column conspicuously exerted or included within the corolla, terminated by 5 teeth ("coronule" of HOCHREUTNER, 1940) at the apex. The "coronule" not well-developed, conspicuous, or relatively elaborate. Stamens 10 or 15, grouped near the apex of the staminal column in 2 or 3 well-developed whorls, 2 weakly-developed whorls, or in no discernible whorls. Anthers sessile, subsessile, or with well-developed filaments. Anthers monothecal, the connective a swollen, cushion-like structure. Pollen spheroidal and echinate. Style branches 3-5, free or united above the apex of the staminal column. Carpels 3-5.

Fruit composed of 3-5 angular, rounded, or obpyriform carpels subtended by a conspicuous, spreading calyx or concealed by a conspicuous, erect calyx. Carpels pubescent with short stellate hairs interspersed with long, simple, hyaline hairs. Carpels not separating or first separating septically then dehiscing loculicidally (but not completely), dehiscence beginning at the apex near the columella. Well-developed vascular bundles that extend from the columella and that are located between and are continuous with adjacent carpels are either



equal to or smaller than the lateral carpel walls in outline, or these vascular bundles are suppressed. Carpels monospermous. Seeds reniform or obpyriform, pendulous with the radicle uppermost.

TYPE-SPECIES : *Humbertiella quararibeoides* Hochr.

### KEY TO SPECIES OF *Humbertiella*

1. Petals included within or scarcely exceeding the calyx in length; staminal column ca. twice the length of the petals, the anthers sessile or subsessile.
  2. Flowers solitary in the axils of leaves that are borne on short shoots; styles 3 (4); stamens 10, in two, barely discernible whorls; anthers sessile; fruits (2-) 3-locular, the wing-like vascular projections from the columella suppressed or fused to the lateral carpel walls ..... 1. *H. quararibeoides*
  - 2'. Flowers paired or variously clustered in the axils of leaves that are borne on the stem; styles 5; stamens 15, in adjacent whorls of 5 stamens each; anthers subsessile; fruits 5-locular, the wing-like vascular projections extending from the columella and equal to the lateral carpel walls in outline ..... 2. *H. henrici*
- 1'. Petals ca. twice the length of the calyx; staminal column scarcely exceeding the length of the petals, the anthers with conspicuous filaments.
  3. Lobes at apex of staminal column well-developed and almost petaloid; stamens in two ranks, one of 5 and the other 10 stamens; fruiting calyx small, the lobes 3-4 mm long ..... 5. *H. sakamaliensis*
  - 3'. Lobes at apex of staminal column small and more or less fleshy; stamens not or weakly developed into two ranks; fruiting calyx large, the lobes 4-12 mm long.
    4. Involucel of 10 (-11) lanceolate bracts united at their bases; calyx erect in fruit; mature carpels obpyriform ..... 6. *H. foliosa*
    - 4'. Involucel of 5-6 (-8) linear bracts, not fused at their bases; calyx spreading in fruit; mature carpels rounded, slightly angular, or angular.
      5. Style branches united for a portion of their length above the apex of the staminal column; stamens weakly separated into two ranks; midvein raised and conspicuous on the lower surface of leaves, secondary veins not discernible except rarely at base of leaves. .... 4. *H. tormeyi*
      - 5'. Style branches free above the apex of the staminal column; stamens not arranged in discernible ranks; midvein and secondary veins raised and conspicuous on the lower surface of leaves ..... 3. *H. decaryi*.

### HUMBERTIELLA sect. HUMBERTIELLA

Calyx spreading and displaying the mature fruit.

#### 1. *Humbertiella quararibeoides* Hochr. — Fig. 1.

Candollea 3 : 3, tab. 1 (1926); Candollea 5 : 2 (1932); H. PERRIER & HOCHR., Fl. Madag. 130 : 17, tab. 6, figs. 1-4 (1955).

TYPE : *Humbert & Perrier de la Bâthie* 2496 (lecto-, here designated, P; isolecto-, G-fragment, K, P, TAN).



Shrubs or much-branched shrubby trees, 2-3 m tall; branches terete, new growth brownish, stellate-pubescent, in age grayish, glabrate. Leaves, petioles, stipules, pedicels, calyx in flower, and carpels in fruit densely stellate-pubescent. Leaves borne on short shoots; leaf blades ovate to subcircular or obovate, 4-12 mm long, 4-12 mm broad, apex rounded or obtuse or emarginate, but young leaves often apiculate, base truncate to obtuse, margins entire, midvein conspicuous below, other veins obscure; not or slightly discoloured, lower surface pale green, upper surface darker green to olive green, both surfaces pubescent with multi-armed hairs, arms ascending; petioles shorter than blades, 2-10 mm long; stipules subulate, 1-2 mm long, often equalling the young petioles.

Flowers solitary in axils of subtending leaves; pedicels 5-14 mm long at anthesis; involucre of 5 bracts, bracts distinct, subulate, 1-2 mm long, appressed to the calyx, pubescent with stellate and simple hairs; calyx green or pale-green, in bud spherical, apiculate with raised sutures, at anthesis 0.4-1.1 cm long, ca. half-divided, lobes triangular, lobe bases 2-5 mm broad, externally pubescent with 10-rayed hairs, internally pubescent with delicate, ascending, 5-rayed hairs; petals green or pale-green, tinted red toward the center, 0.7-1.1 cm long, scarcely exceeding the calyx in length, ca. 3-4 mm broad at the apex, externally pubescent with scattered (6-) 8-rayed stellate and simple hairs with swollen bases, internally pubescent with simple hairs with swollen bases; staminal column whitish-green, conspicuously exserted, ca. twice the length of the corolla 1.2-2 cm long, glabrous, terminated by 5 minute lobes, pubescent with simple hairs; stamens borne immediately below the apex, sessile, contiguous, in two barely discernible whorls of 5 anthers each; style branches 3 (4), free, exceeding the staminal column by ca. 2 mm, pubescent with simple, hyaline hairs; carpels 3 (4).

Fruit 5-8 mm in diameter, composed of (2-) 3 subspherical carpels subtended by the spreading calyx, calyx lobes 4-6 mm long, the carpels fused, not separating septicidally, the wing-like vascular projections from the columella suppressed or fused the carpel walls, each carpel dehiscing loculicidally (but not completely); seeds reniform, pubescent with simple hyaline hairs (mature seeds not seen).

DISTRIBUTION AND ECOLOGY. — Restricted to xerophyllous bush on calcareous (Eocene) hills and escarpments at 10-200 m in southwestern Madagascar.

OBSERVATIONS. — *Humbertiella quararibeoides* is characterized by leaves and flowers borne on short shoots; a conspicuously exserted staminal column; an extreme reduction in the androecium (there are only 10, sessile anthers weakly arranged in two whorls subtending the apex of the staminal column); a (2-) 3-carpellate fruit; and the apparent fusion of the wing-like vascular projections from the columella to the lateral walls of the carpels. It is most clearly allied to *H. henrici* with which it shares a similar perianth arrangement, the corolla scarcely exceeding the calyx in length; a conspicuously exserted staminal column; and an extreme reduction in the androecium. The extreme reduction in the androecium of *H. quararibeoides* is clearly an advanced character. Another specialization is the reduction in the number of carpels and concomitant reduction in the number of styles from five to three (rarely four). No specimens were seen with 4-carpellate fruits, but additional collecting may yield such material.

A collection (Humbert & Swingle 5208) at G is a mixed collection of three sheets that includes glabrate, adult and tomentose, juvenile branches of *Humbertiella quararibeoides* and sterile branches of *Megistostegium retusum* Hochr. The last material accounts for the



discrepancy between the leaf measurements of *H. quararibeoides* given here and those cited by HOCHREUTINER (1932) and PERRIER DE LA BÂTHIE & HOCHREUTINER (1955).

MATERIAL STUDIED : *Bosser 10154*, Befanamy (Tuléar), fr., 11.1956 (P, TAN); *Bosser 19074*, Sarodrano, Tuléar, fl., 3.1964 (K, MO, P, TAN); *Capuron 18668-SF*, bush, sur les escarpements de calcaires éocènes, à 14 km environ au Nord d'Itampolo, fl., fr., 3.7.1958 (MO, P, TEF); *Capuron 20258-SF*, plateau calcaire à l'Est du Lac Tsimanampetsotsa, sur la limite Nord de la R.N. X [Lac Tsimanampetsotsa], fl., 12.4.1961 (MO, P, TEF); *Capuron & Chauvet 20815-SF*, bush, sur calcaire, à la base du rebord du plateau calcaire entre la Table et Sarodrano (Tuléar), fl., 1.1962 (P, TEF); *Dequaire 27497*, La Table, Tuléar, 1952-1955 (MO, P); *Humbert 14354*, vallée du Fiherenana à 15-25 km, en amont de Tuléar, coteaux calcaires rive droite, 100-200 m, fl., 3.1934 (P); *Humbert & Perrier de la Bâthie 2496* (lectotype), environs de Tuléar, coteaux calcaires, 10-200 m, fl., 14-26.9.1924 (G-fragment, K, P, TAN); *Humbert & Swingle 5208*, environs de Tuléar, coteaux calcaires (La Table), 25-200 m, fl., fr., 7.8.1928 (G, P); *Humbert & Swingle 5208 bis*, *ibid.* (G); *Humbert & Swingle 5322*, environs du lac Manampetsa [Tsimanampetsotsa] (Côte Sud-Ouest), 20-100 m, 16-20.8.1928 (P).

## 2. *Humbertiella henrici* Hochr. — Fig. 1.

Candollea 5 : 3 (1932); H. PERRIER & HOCHR., Fl. Madag. 130 : 18, *tab. 6, figs. 5-11* (1955). *Humbertiella pseudohenrici* HOCHR., Candollea 12 : 185 (1949). Type : *Humbert 13089* (lecto-, here designated, G; isolecto-, K, P, TAN).

*Humbertiella henrici* HOCHR. *fa. microphylla* HOCHR. & HUMBERT in H. PERRIER & HOCHR., Fl. Madag. 130 : 20 (1955), *nom. inval. sine descr. lat.*

TYPE : *Humbert & Swingle 5693* (lecto-, here designated, G; isolecto-, G, K, MO, P, TAN).

Shrubs, small trees or trees 2-4 m tall; branches terete, new growth ferruginous, stellate-pubescent, in age grayish, glabrate. Leaves, petioles, stipules, peduncles, pedicels, involucellar bracts, calyx in flower, and carpels in fruit densely stellate-pubescent. Leaves clustered at branch tips, ascending; leaf blades lanceolate-ovate, broadest below the middle, 0.6-4.5 cm long, 0.6-2.7 cm broad, apex obtuse, slightly emarginate, slightly mucronate, base rounded, margins entire, palmately 3-5-veined at the base, midvein and primary veins conspicuous below, lower surface light green to ferruginous, pubescent with stalked, multi-armed hairs, arms ascending, upper surface dark green, pubescent with sessile, multi-armed hairs, arms appressed; petioles shorter than the blades, 5-25 mm long; stipules acicular, 4-5 mm long.

Inflorescences axillary, 2-3-flowered corymbs clustered at the branch tips; peduncles 0.5-1 cm long at anthesis; pedicels 0.5-0.7 cm long at anthesis; involucl of 5 bracts, bracts more or less distinct or united into a cupule, 1-5 mm long, appressed to the calyx; calyx greenish-tan, in bud spherical, sutures visible only at the apex, at anthesis 5-7 mm long, ca. one-third to half-divided, lobes broadly triangular, lobe bases 3-4 mm broad, externally pubescent with robust, yellowish, multi-armed hairs, arms ascending, internally pubescent with delicate, white, multi-armed hairs, arms ascending; petals green, greenish-white or green with light rose at the base, 0.7-1.1 cm long, scarcely exceeding the calyx in length, ca. 3 mm broad at the apex, externally pubescent with robust stellate and scattered simple hairs, internally glabrous; staminal column conspicuously exserted, ca. twice the length of the corolla, 1.2-1.6 cm long, glabrous, terminated by 5 minute lobes, stamens borne immediately below the apex, sessile or subsessile,



contiguous, in 3 whorls with 5 anthers each; style branches 5, free, exceeding the staminal column by ca. 2 mm, glabrous; carpels 5.

Fruit 9-10 mm in diameter, composed of 5 subspherical carpels subtended by the spreading calyx, calyx lobes 4-10 mm long, carpels first separating septicidally, the wing-like vascular projection from the columella equal to the lateral carpel walls in outline, later dehiscing loculicidally (but not completely); seeds reniform, glabrous.

**DISTRIBUTION AND ECOLOGY.** — Occurring on a wide range of acidic substrates; alluvium or ancient dunes, recent sandstones, granitic or crystalline massifs, and rocky, gneissic slopes at 200-1200 m in southeastern Madagascar.

**OBSERVATIONS.** — *Humbertiella henrici* is readily identifiable in flower. It and *H. quararibeoides* both have the petals included within or scarcely exceeding the calyx in length and both have sessile or subsessile anthers. However, *H. henrici*, unlike *H. quararibeoides*, has 15 (versus 10) anthers in three whorls of five stamens each; wing-like vascular projections extending from the columella and equal to the lateral carpel walls in outline (versus suppressed or fused vascular projections); and lanceolate-ovate and apically obtuse (versus ovate to suborbicular or obovate and frequently emarginate) leaves.

Although fruiting specimens of *Humbertiella henrici* can be distinguished by leaf shape and size from most other species of *Humbertiella*, there appear to be no reliable characters to separate *H. henrici* from *H. decaryi* in fruiting condition. Geography and substrate appear to separate the two species but neither is of practical value when examining specimens. *Humbertiella henrici* appears to be restricted to acidic substrates in the region near Fort Dauphin while *H. decaryi*, generally found on calcareous substrates, replaces it to the west (Fig. 4).

The possibility that *Humbertiella henrici* is a male-sterile form of *H. decaryi* has been considered and rejected. Dimorphism in petal size is known to be associated with some male sterile breeding systems (BAKER, 1948; DORR, 1990) and anther and filament morphology can differ between fertile and male-sterile flowers. Although the petals of *H. henrici* are much shorter than those of *H. decaryi*, the flowers of *H. henrici* produce well-developed pollen. At present, there is insufficient material to test whether or not the pollen of this and other species is viable.

*Humbertiella henrici* is variable with respect to leaf size and shape; and epicalyx size and degree of fusion. Typically leaves are large (2-4.5 cm long, 1-2.7 cm broad), although some specimens have very small leaves (0.6-1.2 cm long, 0.6-1 cm broad). The epicalyx varies from a structure with short, more or less free lobes that is slightly removed from the calyx to a structure with short, fused lobes subtending the calyx to one with longer lobes that are more or less free and similarly subtending the calyx. Some collections (e.g., *Humbert 13089*) exhibit the full range of variability with respect to the fusion of epicalyx lobes, some flowers having more or less free epicalyx lobes and others fused epicalyx lobes.

**MATERIAL STUDIED :** Sud-Est : *Capuron 28581-SF*, versant Sud et plateau sommital du massif granitique du Vohitsandriana (au S de Ranopiso), fl., 8.12.1968 (P, TEF); *Cours 4644*, itinéraire de Didy à Brickaville (forêt orientale) [localité erronée], fl., fr., s.d. (MO, P, TAN); *Decary 2627*, District d'Ambovombe (Androy), vallée du Mandrare, alluvions, fl., 14.4.1924 (G-fragment, P); *Decary 2461*, Bevilany (Androy), fl. bud, 29.3.1924 (G-fragment, P); *Decary 3063*, District d'Ambovombe, Behara, socle cristallin, fl., 1.9.1924 (G-fragment, P); *Decary 4376*, massif de l'Angavo à l'Est d'Antanimora,



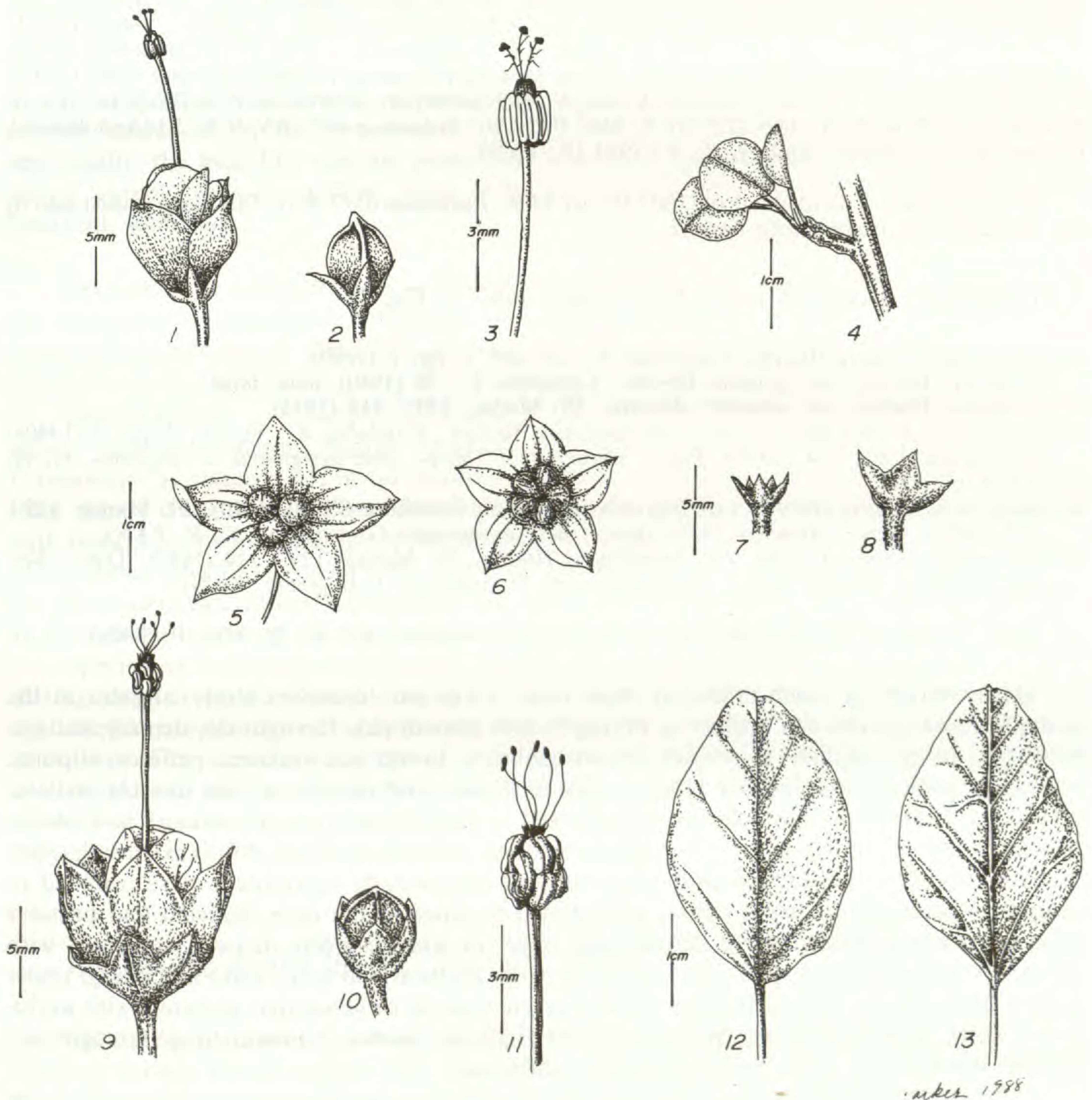


Fig. 1. — **Humbertiella quararibeoides** : 1, flower; 2, flower bud; 3, androecium; 4, short shoot with leaves; 5, fruit. (1, 3, 4, Capuron & Chauvet 20815-SF, P; 2, Humbert & Perrier de la Bâthie 2496, P; 5, Humbert 14354, P). — **Humbertiella henrici** : 6, fruit; 7, 8, involucels; 9, flower; 10, flower bud; 11, androecium; 12, leaf, adaxial surface; 13, leaf, abaxial surface. (6, 8-13, Capuron 28581-SF, P; 7, Decary 3063, P).



P[rovince] de Fort-Dauphin, fl., 21.7.1926 (G-fragment, P); *Decary* 4450, *ibid.*, fl., fr., 19.7.1926 (G-fragment, P); *Decary* 9108, au Sud-Ouest d'Ambovombe, Kotoala, dunes anciennes, fl., fr., 9.8.1931 (G-fragment, P); *Decary* 9340, Beteny (limite Nord-Est de l'Androy) sur les gneiss, fl., 22.11.1931 (MO, P); *Decary* 10200, Ranofotsy, District de Fort Dauphin, sur les grès récents, fl., fr., 29.7.1932 (G, P); *Humbert* 12729, vallée moyenne du Mandrare près d'Anadabolava, Mont Vohitrosy, 800-850 m, fl., 12.1933 (G-fragment, P); *Humbert* 13089 (lectotype of *H. pseudohenrici*), vallée de la Manambolo (bassin du Mandrare) au confluent de la Sakamalio : Mont Morahariva, pentes rocheuses (gneiss), 1000-1200 m, fl., fr., 12.1933 (G, K, P, TAN); *Humbert & Swingle* 5693 (lectotype), environs de Fort-Dauphin : près de Bevilany, 200-300 m, fl., fr., 14.9.1928 (G, K, MO, P, TAN); *Rakotoson* 6577-RN, R.N. XI [Andohahela], Canton Behara, District Androy, fl., 6.7.1954 (P, TAN).

COMMON NAME : Seta (Antandroy) (fide *Decary* 4376; *Rakotoson* 6577-RN). This name is used also by the Mahafaly for *Humbertiella decaryi*.

### 3. *Humbertiella decaryi* (Hochr.) Dorr, *comb. nov.* — Fig. 2.

*Neohumbertiella decaryi* HOCHR., *Candollea* 8 : 29, *tab. 1, fig. 1* (1940).

— *N. decaryi* HOCHR. var. *genuina* HOCHR., *Candollea* 8 : 30 (1940), *nom. inval.*

— *N. decaryi* HOCHR. var. *decaryi* : HOCHR., *Fl. Madag.* 129 : 114 (1955).

*Neohumbertiella decaryi* HOCHR. var. *ambovombensis* HOCHR., *Candollea* 8 : 30, *tab. 1, fig. 2* (1940); *Fl. Madag.* 129 : 114 (1955). Type : *Decary* 8858 (lecto-, here designated, P; isolecto-, G, K, TAN).

*Neohumbertiella decaryi* HOCHR. var. *fiherenensis* HOCHR., *Candollea* 8 : 30 (1940); *Fl. Madag.* 129 : 114 (1955). Type : *Humbert* 14381 (lecto-, here designated, G; isolecto-, K, P, TAN).

*Neohumbertiella decaryi* HOCHR. var. *meridionalis* HOCHR., *Fl. Madag.* 129 : 114 (1955). Type : *Service Forestier* 2723-SF (lecto-, here designated, P; isolecto-, G-fragment, TAN).

TYPE : *Humbert* 12490 (lecto-, here designated, P; isolecto-, BR, G, K, MO, P, TAN).

Bushy shrubs or much-branched small trees, 2-8 m tall; branches terete, angular at the summit of new growth (an artifact of drying?), new growth pale ferruginous, densely stellate-pubescent, in age reddish- to grayish-brown, glabrate. Lower leaf surfaces, petioles, stipules, peduncles, pedicels, involucellar bracts, calyx in flower, and carpels in fruit densely stellate-pubescent. Leaves on short shoots or clustered at the branch tips, ascending; leaf blades elliptic, ovate to widely-ovate, or ovate-lanceolate, 0.7-6.2 cm long, 0.6-3 cm broad, apex rounded, obtuse or cuneate, slightly mucronate or occasionally emarginate, base rounded to cuneate or attenuate, margins entire, palmately 3-5-veined at the base, midvein and primary veins conspicuous below, lower surface pale olive- or whitish-green, densely pubescent with whitish or whitish interspersed with larger yellowish, multi-armed hairs, arms ascending, upper surface dark olive to brownish-green or dark green, smooth or somewhat scabrous with multi-armed hairs, arms ascending; petioles shorter than the blades, 5-19 mm long, ferruginous; stipules acicular, ca. 2 mm long, extremely caducous.

Inflorescences axillary, 2-5-flowered corymbs (flowers rarely solitary) clustered at the branch tips; peduncles 0.9-1.2 cm long at anthesis; pedicels 0.8-1.6 cm long at anthesis; involucl of 5-6 (-8) bracts, bracts distinct, acicular, scarcely visible to 1-3.5 mm long, appressed to the calyx; calyx in bud spherical, sutures visible at the apex, at anthesis 5-8 mm long, ca. one-third to half-divided, the lobes triangular, lobe bases ca. 2-3 mm broad, externally pubescent with short, whitish interspersed with longer yellowish, multi-armed hairs, internally uniformly white pubescent with multi-armed hairs; petals rose or rose-violet, (1-)



1.3-1.7 cm long, conspicuously exceeding the calyx in length, 2.5-5 mm broad toward the apex, externally pubescent with multi-armed hairs, internally glabrous; staminal column slightly exserted, 1.5-2 cm long, glabrous or villous at the base, terminated by 5 fleshy lobes, lobes pubescent with simple hairs; stamens 15, borne immediately below the apex, filaments ca. 2 mm long, whorls not discernible; style branches 5, free, exceeding the staminal column by ca. 3 mm, glabrous; carpels 5.

Fruit 5-9 mm in diameter, composed of 5, more or less spherical to slightly angular carpels, subtended by the spreading calyx, calyx lobes 4-8 mm long, carpels first separating septicidally, the wing-like vascular projection from the columella smaller than or equal to the lateral carpel walls in outline, later dehiscing loculicidally (but not completely); seeds reniform, glabrous.

**DISTRIBUTION AND ECOLOGY.** — Found in xerophyllous bush, tropophilous forest, and in the transition between bush and forest on calcareous hills, but also on red sand and other crystalline substrates at 100-500 m in southern and southwestern Madagascar.

**OBSERVATIONS.** — *Humbertiella decaryi* is characterized by the petals twice as long as the calyx; staminal column slightly exserted and terminated by 5 fleshy, pubescent lobes ("coronule"); stamens 15, in no discernible whorl; and anthers borne on filaments 2-3 mm long. Apart from these uniform floral characters the species is extremely variable especially with respect to the morphology of the involucellar bracts and the morphology and pubescence of the leaves. HOCHREUTNER (1940, 1955) recognized four varieties of *Neohumbertiella decaryi* (= *H. decaryi* var. *decaryi*), but noted that there were many transitional forms uniting them. In the present treatment these varieties are considered to be synonyms of the nominate variety.

Specimens from the northwestern portion of the range of *Humbertiella decaryi* can be distinguished from the nominate variety by leaf shape and pubescence and the relative size of the vascular bundles extending from the columella (they are larger than the lateral carpel walls in outline). This material is segregated as *H. decaryi* var. *sakarahensis*. Little flowering material is available and additional collections are desirable. A great number of the fruits appear to be infected with galls. These infestations also occur in specimens of what HOCHREUTNER (1955) recognized as *Neohumbertiella decaryi* var. *meridionalis* (= *H. decaryi* var. *decaryi*).

***Humbertiella decaryi* (Hochr.) Dorr var. *decaryi*.** — Fig. 2.

Shrubs or small trees, 2-5 m tall. Leaf blades elliptic, ovate to widely-ovate, 0.7-3 cm long, 0.6-3 cm broad. Lower surface pale olive green, densely pubescent with whitish interspersed with yellowish, multi-armed hairs; upper surface dark green, scabrous with multi-armed hairs. Carpels in fruit with a wing-like vascular projection smaller than the lateral carpel walls in outline.

**MATERIAL STUDIED :** *Bosser 1422*, route d'Antanimora, fl., 12.1.1966 (MO, TAN); *Bosser 14101*, Beomby (Ouest d'Ejeda), Plateau Mahafaly, fl. buds, fr., 3.1960 (P, TAN); *Bosser 14308*, Plateau Mahafaly, Ankahirano (Ouest d'Ejeda), fl., fr., 3.1960 (MO, P, TAN); *Bosser 14311*, *ibid.*, fl., 3.1960 (P, TAN); *Bosser 19149*, Sud d'Ampanihy, fl., 3.1964 (P, TAN); *Capuron 334-SF*, forêt d'Analamatahotra,



au SE de Bekily, fl., fr., 2.1949 (G, P); *Capuron 8542-SF*, restes de forêts entre Tsivory et Imanombo, fl., 1.10.1953 (MO, P); *Capuron 11641-SF*, vestiges de forêts tropophylles, dans la vallée de la Menarahaka, à l'Est d'Ihosi, fr., 2.1955 (K, P); *Capuron 11706-SF*, bush aux environs d'Ambia (au Nord d'Antanimora), 2.1955 (P); *Capuron 11710-SF*, bush du massif de l'Angavo, à l'Est d'Antanimora, fl. bud, 2.1955 (MO, P, TEF); *Capuron 11894-SF*, bush aux environs de Vohitsara, entre Betioky et Soalara, fl., 3.1955 (G, K, MO, P, TEF); *Capuron 20440-SF*, entre Antanimoro et Ambovombe, fl., 7.12.1961 (K, MO, P, TEF); *Capuron 22275-SF*, aux environs Nord d'Andranohinaly (PK 43 de la route Tuléar-Sakaraha), fl., 12.12.1962 (G, K, MO, P, TEF); *Capuron 22473-SF*, versant méridional du Massif de l'Angavo, à l'Est d'Antanimora, fr., 23.1.1963 (B, P, TEF); *Capuron 22513-SF*, à l'Ouest de Imanombo, fl. bud, fr., 24.1.1963 (P); *Capuron 22527-SF*, forêt d'Analamatahitsa (Analamatahotra) entre Bekily et la route Beraketa-Antanimora, fr., 28.1.1963 (BR, MO, P); *Capuron 28488-SF*, vallée de la Menarahaka à l'Est d'Ihosi, fl., 19.12.1968 (K, MO, P, TEF); *Capuron & Chauvet 20756-SF*, au Nord d'Andranohinaly (PK 45 de la route Tuléar-Sakaraha), fl., fr., 12.1961 (P, TEF); *Chauvet 6*, environs de Tuléar-Table, fl., 14.1.1961 (P); *Cours 5267*, District d'Ambovombe, Poste de Tsihombe, Canton d'Antaritarika, forêt de Hazoara près d'Imongy, plateau calcaire d'Antaritarika, fl., 23.9.1958 (P); *Decary 2653*, District d'Ambovombe (Androy), fl., 16.4.1924 (G, K, P, TAN); *Decary 3503*, *ibid.*, fl., fr., 11.2.1925 (P); *Decary 3509*, *ibid.*, fl., fr., 14.2.1925 (NY, P); *Decary 3535*, *ibid.*, fl., 1.2.1925 (G, P); *Decary 3538*, *ibid.*, fl., 17.1.1925 (P); *Decary 3719*, *ibid.*, fl., 30.4.1925 (G, P); *Decary 8455*, *ibid.*, fl., 2.2.1931 (G, P); *Decary 8858* (lectotype of *N. decaryi* var. *ambovombensis*), Antanimora au N d'Ambovombe, fl., 28.4.1931 (G, K, P, TAN); *Decary 9019*, Tranomaro au Nord-Est d'Ambovombe, fl., 19.6.1931 (K, P, TAN); *Decary 9371*, Ampilira (limite NE de l'Androy), fl., 23.11.1931 (K, P, TAN); *Descoings 1422*, route d'Antanimora, fl., 12.1.1956 (MO); *Humbert 12490* (lectotype), vallée moyenne du Mandrare près d'Anadabolava, fl., 12.1933 (BR, G, K, MO, P, TAN); *Humbert 14361*, vallée du Fiherenana à 15-25 km en amont de Tuléar, 3.1934 (G, P); *Humbert 14381* (lectotype of *N. decaryi* var. *fiherenensis*), *ibid.*, fl., 3.1934 (G, K, P, TAN); *Humbert & Capuron 28823*, environs d'Antanimora (Androy), 30-35 km au N d'Ambia, fl., 6-9.2.1955 (K, MO, P); *Humbert & Capuron 29451*, plateau Mahafaly à l'Ouest de Betioky, fl., 17-20.3.1955 (B, BR, G, K, MO, P, WAG); *Humbert & Capuron 29479*, plateau Mahafaly à l'Ouest de Betioky, fl. bud, 17-20.3.1955 (MO, P); *Keraudren 832*, plateau calcaire Mahafaly, à 10 km E d'Ankalirano, fl., fr., 21.3.1960 (P); *Service Forestier 2723-SF*, route d'Iakora, Ihosi (G-fragment, P, TAN); *Service Forestier 3433-SF*, Tanandava-Behara, fr., 11.4.1951 (G, P, TAN).

COMMON NAMES : Fandravolafotsy and Seta (Mahafaly) (fide *Capuron 22473-SF*; *Humbert 12490*; *Service Forestier 3433-SF*). The former name appears to refer to the color of the hairs on the leaves, i.e., "vola fotsy" or silver. The latter name is used also for *Dombeya tremuliformis* Arènes (*Sterculiaceae*) by the Mahafaly and for *Humbertiella henrici* by the Antandroy.

### ***Humbertiella decaryi* (Hochr.) Dorr var. *decaryi* vel aff.**

Several specimens appear to be intermediate between *Humbertiella decaryi* and *H. tormeyi*. In one (*Bosser 15700*) the flowers resemble those of *H. tormeyi* in that the style branches are briefly united above the staminal column, but the petals are relatively short. Also, although distinctly oval, the leaves are discoloured and similar in pubescence to those of *H. tormeyi*. Other specimens (*Decary 2642*, *Capuron 11706-SF*) vegetatively resemble *H. decaryi*, but different flowers have styles that are either united or free above the staminal column.

One of the paratypes of *Humbertiella sakamaliensis* (*Humbert 13084*) is referred tentatively to *H. decaryi* because the accrescent calyces subtending the fruit are much larger than the calyces of another paratype of *H. sakamaliensis* and they resemble those of *H. decaryi*. In addition, the fruits are infested with galls similar to those found in some populations of *H. decaryi*. The leaves are similar in shape to those of *H. sakamaliensis*, but the pubescence and venation approach also *H. decaryi* and *H. henrici*.



Fruiting material alone was available of *Decary 2783* and *Decary 4353* is sterile. Neither specimen can be determined exactly. An annotation on the latter specimen is difficult to decipher, but it appears to indicate that the wood is hard and is used for light spears ("sagaie").

MATERIAL STUDIED : *Bosser 15700*, plateau calcaire Mahafaly, Ouest d'Ejeda, fl., 2.1962 (MO, P, TAN); *Capuron 11706-SF*, Sud-Ouest : bush aux environs d'Ambia (au Nord d'Antanimora), fl., 2.1955 (P); *Decary 2642*, District d'Ambovombe, fl., 17.4.1924 (G, P); *Decary 2783*, Ambovombe, fr., 21.3.1924 (P); *Decary 4353*, massif de l'Angavo, près d'Antanimora, P<sup>ce</sup> de Fort Dauphin, sterile, 21.7.1926 (P); *Humbert 13084*, vallée de la Manambolo, rive droite (bassin du Mandrare) aux environs d'Isomono (confluent de la Sakamalio) : Mont Morahariva, pentes rocailleuses (gneiss), 1000-1200 m, fr., 12.1933 (G, P).

***Humbertiella decaryi* (Hochr.) Dorr var. *sakarahensis* Dorr, var. nov.**

*A var. decaryi foliis ovatis vel ovato-lanceolatis et carpellorum projectura vasculari aliformi e columella producta carpelli paritem lateralem aequanti differt.*

TYPE : *Capuron 20746-SF* (holo-, P; iso-, G, K, MO, P, TEF).

Shrubs or small trees, 5-8 m tall. Leaf blades ovate to ovate-lanceolate, 1.8-6.2 cm long, 0.6-2.2 cm broad. Lower leaf surfaces uniformly white pubescent, densely to sparsely covered with multi-armed hairs, upper surfaces dark olive to brownish-green, pubescent with multi-armed hairs, arms erect, shorter than the stellate hairs below. Carpels in fruit with a wing-like vascular projection equal to the lateral carpel wall in outline.

MATERIAL STUDIED : *Capuron 20215-SF*, Sud-Ouest : route Tuléar, Manombo, au Nord de Fiherenana, fr., 30.3.1961 (P); *Capuron 20609-SF*, Ouest : plateau de Vineta, entre Tuléar et Sakaraha, fl., fr., 26.12.1961 (G, K, P, TEF); *Capuron 20722-SF*, Ouest : route Tuléar-Sakaraha, vers les PK 55-65 (à l'Ouest d'Andranovory), fr., 12.1961 & 1.1962 (BR, G, K, P, TEF); *Capuron 20746-SF* (type), *ibid.*, fl., 12.1961 & 1.1962 (G, K, MO, P, TEF); *Humbert 20133*, plateau au sud des gorges du Fiherenana entre Andranohinaly et Andranovory, fr., 3-4.2.1947 (BR, P); *Service des Eaux et Forêts 9826-SF*, forêt Troboampamaky-Beharona-Manja, fr., 14.3.1954 (P); *Service Forestier 4541-SF*, km 45-50 route Tuléar, fr., 29.1.1952 (P, TAN, TEF).

COMMON NAMES : Belelo (fide *Service des Eaux et Forêts 9826-SF*) and Seta (fide *Service Forestier 4541-SF*).

**4. *Humbertiella tormeyi* Dorr, sp. nov. — Fig. 2.**

*A. H. decaryi* (Hochr.) Dorr *stylis ultra columnae staminalis apicem connatis, foliis oblongis, obovatis vel ellipticus, et laminae costa tantum facie superiori manifesta differt.*

TYPE : *Capuron 20242-SF* (holo-, P; iso-, P, TEF).

Shrubs, to 1.5 m tall; branches terete, angular at the summit of new growth (an artifact of drying?), new growth ferruginous, densely stellate-pubescent, in age reddish-black, sparsely



stellate-pubescent or glabrate. Lower leaf surfaces, petioles, stipules, peduncles, pedicels, involucellar bracts, calyx in flower, and carpels in fruit densely stellate-pubescent. Leaves scattered along the branches; leaf blades oblong to obovate or elliptic, 1-2.8 cm long, 0.5-1.5 cm broad, apex acute or obtuse, mucronulate, base attenuate to cuneate, margins entire, midvein conspicuous and raised below, other veins obscure, discolorous, lower surface greenish-white, pubescent with white interspersed with yellowish, multi-armed hairs, arms ascending, upper surface olive-green, pubescent with multi-armed hairs, arms appressed; petioles shorter than the blades, 3-10 mm long; stipules lanceolate, 1-2 mm long.

Inflorescences axillary, 3-4 flowered corymbs; peduncles 0.5-1 cm long, subtended by lanceolate, 1-2 mm long bracts; pedicels 1-1.5 cm long at anthesis; involucl of 5 bracts, bracts distinct, acicular, 1-2 mm long, appressed to the calyx; calyx greenish-tan, in bud spherical to obovoid with raised sutures, at anthesis 0.7-1 cm long, ca. half-divided, the lobes widely cuneate to deltate, lobe bases 2-3 mm broad, externally pubescent with robust, yellowish, multi-armed hairs, internally pubescent with delicate, white, multi-armed hairs; petals violet or mauve-pink, to 1.5 cm long, exceeding the calyx in length, ca. 8-12 mm broad at the apex, externally pubescent with scattered, (7-) 8-rayed stellate hairs, internally pubescent towards the base with scattered simple hairs with swollen bases; staminal column included within the corolla, 1-1.5 cm long, glabrous, terminated by 5 fleshy lobes, lobes pubescent with simple hairs; stamens borne immediately below the apex, filaments ca. 2-4 mm long, in two, weakly-developed whorls, 5 anthers below and 10 anthers above; style branches 5, united for ca. 3-4 mm above the apex of the staminal column, then free and ca. 2 mm long, glabrous; carpels 5.

Fruit 5-10 mm in diameter, composed of 5 angular carpels, the whole star-like, subtended by the spreading calyx, calyx lobes 7-12 mm long, carpels first separating septicidally, the wing-like vascular projections from the columella equal to the lateral carpel walls in outline, later dehiscing loculicidally (but not completely); seeds reniform, glabrous.

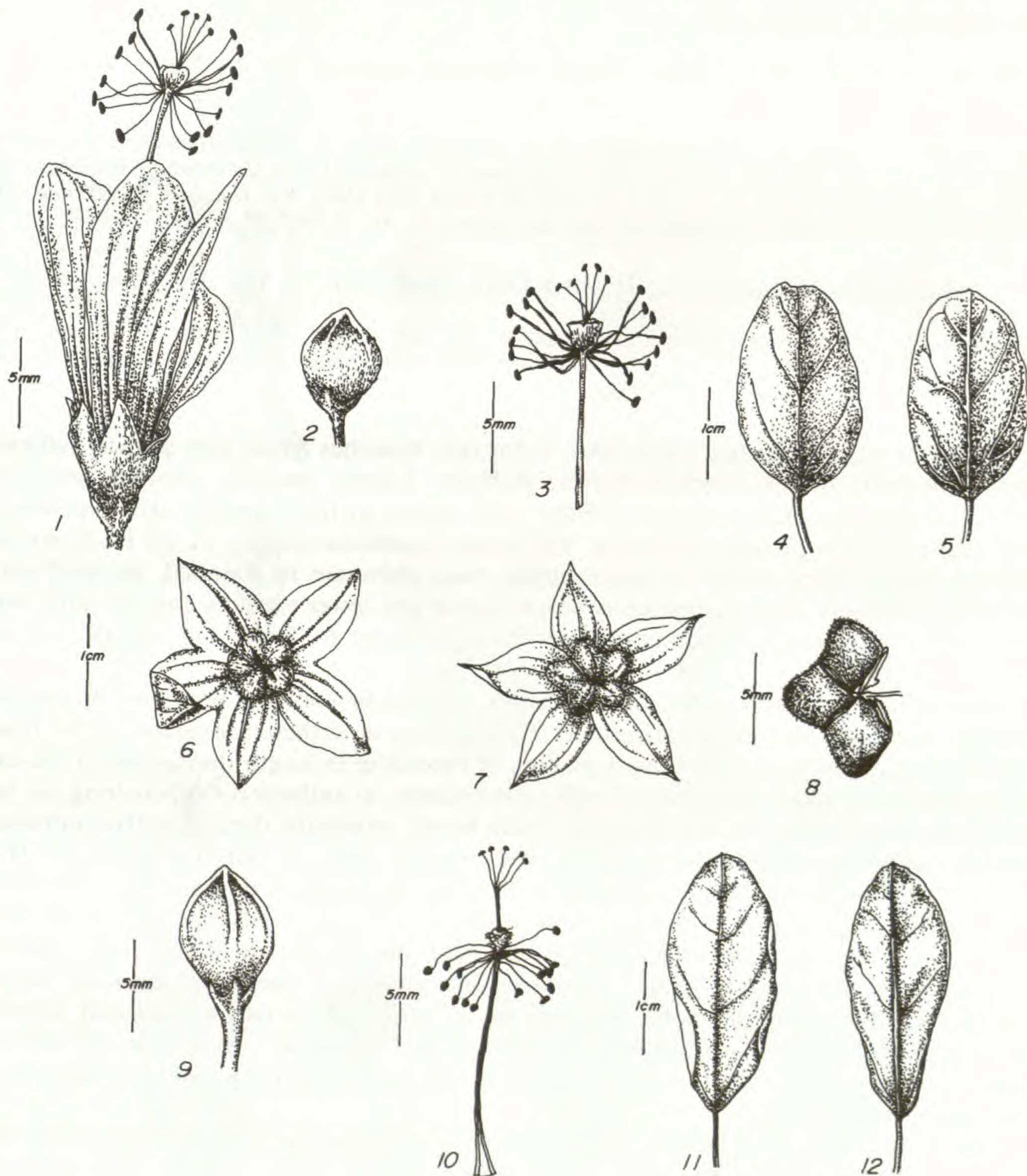
**DISTRIBUTION AND ECOLOGY.** — Evidently restricted to sandstone or siliceous sand in the Isalo Region at elevations of 800-1250 m.

**OBSERVATIONS.** — It is not surprising that the Isalo Plateau, a region that harbors many endemics, should yield a new species of *Humbertiella*. *Humbertiella tormeyi* is easily distinguished in flower by the style branches that are united above the apex of the staminal column. The orientation of the flower is difficult to interpret since living material has not been seen. It is impossible to tell if the flower is closed or open in nature. None the less, the petals are clearly longer than the calyx lobes. The staminal column, if the flower were closed, would be included within or slightly exerted beyond the petals. The anthers and style would be exerted in either case.

The leaves of *Humbertiella tormeyi* are distinctive. The shape (oblong to obovate or elliptic) and venation (midvein alone visible above) differ from those of all other species of *Humbertiella*.

*Humbertiella tormeyi* appears to be related to *H. decaryi*; the teeth at the apex of the staminal column in both species are more or less fleshy and pubescent, the stamens are 15 in number and borne on filaments, the accrescent calyx subtending the 5 carpels in fruit is large and conspicuous, and the fruit dehisces septicidally to reveal 5 wing-like vascular projections that are connected to the columella and more or less equal to the lateral carpel walls in outline.





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Fig. 2. — **Humbertiella decaryi** : 1, flower; 2, bud; 3, androecium; 4, leaf, adaxial surface; 5, leaf, abaxial surface; 6, fruit. (1-5, *Humbert 12490, P*; 6, *Capuron 20756, P*). — **Humbertiella tormeyi** : 7, fruit; 8, fruit with calyx and two carpels removed; 9, flower bud; 10, androecium; 11, leaf, adaxial surface; 12, leaf, abaxial surface. (7-12, *Capuron 11650-SF, P*).



The specific epithet honors Kathleen TORMEY, diplomat assigned from 1983 to 1986 to the U. S. Embassy in Antananarivo.

MATERIAL STUDIED : *Bosser* 19892, sommet d'une table gréseuse, Col des Tapias, Isalo, fl., fr., 11.2.1970 (P, TAN); *Capuron* 11650-SF, massif gréseux de l'Isalo, au col des Tapia, fl., fr., 2.1955 (P, TEF); *Capuron* 18581-SF, massif de l'Isalo au Col des Tapia, fr., 19.6.1958 (P, TEF); *Capuron* 20242-SF (type), plateau de l'Isalo, au Col des Tapia, fl., fr., 8.4.1961 (MO, P, TEF); *Homolle* 1544, without locality, fl., fr., s.d. (K, MO, P); *Humbert* 28684, plateaux et vallées de l'Isalo à l'Ouest de Ranohira, grès et sables siliceux, 800-1250 m, fl., fr., 29.1-2.2.1955 & 8-10.4.1955 (MO, P); *Humbert* 29850, *ibid.*, (P); *Morat* 2476, pente de table cuirassée, 2<sup>ème</sup> col des tapias, fl., fr., 2.1967 (P, TAN).

5. **Humbertiella sakamaliensis** (Hochr.) Dorr, *comb. nov.* — Fig. 3.

*Neohumbertiella sakamaliensis* HOCHR., *Candollea* 8 : 31, *tab.* 2, *figs.* 1-4 (1940); *Fl. Madag.* 129 : 116, *tab.* 28, *figs.* 5-6 (1955). Type : *Humbert* 13344 (lecto-, here designated, G; isolecto-, BR, G, K, P, TAN).

Shrubs or much branched small trees, 1-2 m tall; branches terete, new growth yellowish, stellate-pubescent, in age blackish-brown, glabrate. Leaves, petioles, stipules, peduncles, pedicels, involucellar bracts, calyx in flower, and carpels in fruit densely stellate-pubescent. Leaves borne on new growth, spreading; leaf blades lanceolate-elliptic, 1.2-2.5 (-2.7) cm long, 0.5-0.8 cm broad, apex obtuse or mucronulate, base attenuate to rounded, margins entire, midvein and primary veins conspicuous below, upper and lower surfaces covered with multi-armed hairs, arms ascending; petioles shorter than the blades, 6-14 mm long; stipules not seen, extremely caducous.

Inflorescences axillary, many-flowered short panicles or corymbs borne at the apices of branches; peduncles to 1 cm long; pedicels 0.6-1 cm long at anthesis; involucl of 5-7 bracts, bracts distinct, filiform, 2-3 mm long, equalling or exceeding in length the sinuses of the calyx lobes; calyx in bud small, subspherical with raised sutures, at anthesis 0.4-0.5 cm long, ca. half-divided, the lobes ovate, the lobe bases ca. 2 mm broad, externally densely stellate-pubescent, internally glabrous, slightly accrescent in fruit; petals pink or red (the color of *Malva sylvestris*, fide *Humbert* 13344) to 0.8 cm long, ca. twice the length of the calyx, ca. 4 mm broad below the apex, externally pubescent with scattered 4-8-armed stellate and simple hairs, internally glabrous; staminal column included within the corolla, ca. 0.5 cm long, glabrous, terminated by a very showy, 5-lobed "coronule", the lobes to 1.5 mm long, glabrous; stamens borne immediately below the apex, filaments ca. 1.5 mm long, in two well-defined whorls, 5 anthers immediately below and opposite the lobes of the "coronule", 10 anthers in a whorl ca. 0.5 mm below the upper whorl; style branches 5, free, exceeding the staminal column by ca. 2 mm, glabrous; carpels 5.

Fruit ca. 5 mm in diameter, composed of 5 subspherical carpels, subtended by a spreading, slightly accrescent calyx, calyx lobes 3-4 mm long, carpels first separating septically, the wing-like vascular projections from the columella smaller than the lateral carpel walls in outline, later dehiscing loculicidally (but not completely); seeds reniform, glabrous.

DISTRIBUTION AND ECOLOGY. — This species occurs on rocky, gneissic slopes in the valleys of the Manambolo and Sakamalia rivers at 500-900 m in southeastern Madagascar.



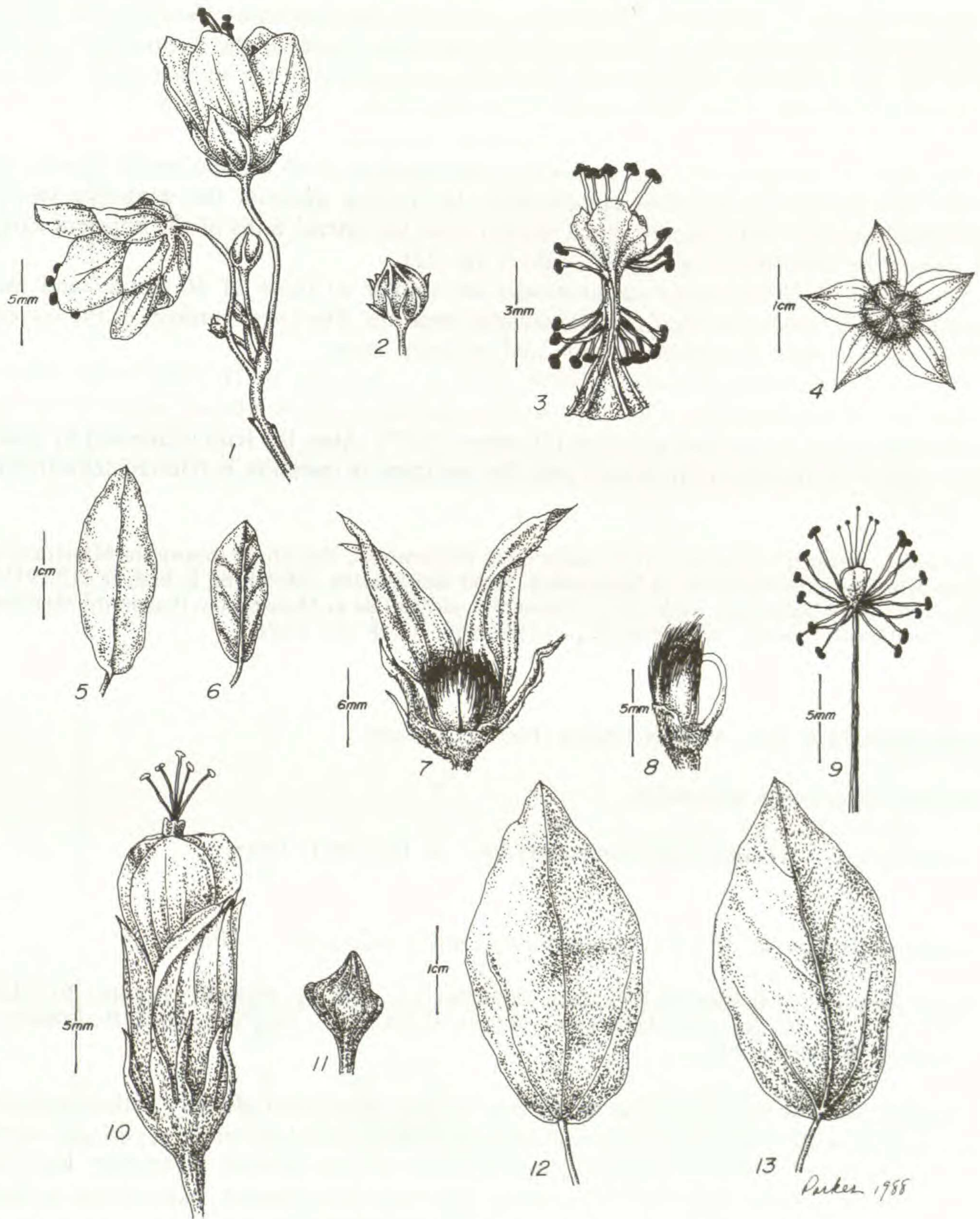


Fig. 3. — *Humbertiella sakamaliensis* : 1, flower; 2, flower bud; 3, androecium; 4, fruit; 5, leaf, adaxial surface; 6, leaf, abaxial surface. (1-6, *Humbert 13344*, P). — *Humbertiella foliosa* : 7, fruit with several epicalyx and calyx lobes removed; 8, fruit with several carpels removed to show the wing-like vascular projection from the columella; 9, androecium; 10, flower; 11, flower bud; 12, leaf, adaxial surface; 13, leaf, abaxial surface. (7-9, *Decary 13195*, P; 10-13, *Decary 13263*, P).



OBSERVATIONS. — The most conspicuous character that separates *Humbertiella sakamaliensis* from the other species of *Humbertiella* is the elaboration of the “coronule”, the five lobes at the apex of the staminal column. Also, the arrangement of the stamens with 5 stamens in a whorl immediately below and opposite each lobe of the “coronule”, and 10 stamens in a second whorl below the first, is a distinguishing character.

The calyx of *Humbertiella sakamaliensis* is the smallest of all the species of *Humbertiella* and the inflorescence is the most complicated. In fruiting material the wing-like vascular projections from the columella are much smaller than the lateral walls of the adjacent carpels as is shown by HOCHREUTNER (1940, *tab. 2, fig. 12*).

The leaves of *Humbertiella sakamaliensis* are similar to those of *H. henrici* and many populations of *H. decaryi* in their pubescence and venation. The lower surfaces of the leaves of all three species have conspicuous mid- and primary veins.

One of the specimens (*Humbert 13084*) cited as a paratype by HOCHREUTNER (1940) is excluded here from the species. The calyx on this specimen is much inflated and does not agree with fruiting calyces of another paratype (*Humbert 13177*). Also, the fruit is infested by galls as is more typical of *Humbertiella decaryi* and the specimen in question is referred tentatively to that species.

MATERIAL STUDIED : *Humbert 13177*, vallée de la Manambolo, rive droite (bassin du Mandrare) aux environs d'Isomono (confluent de la Sakamalio), Mont Morahariva, 500-900 m, fl. bud, fr., 12.1933 (G, P); *Humbert 13344* (lectotype), vallée de la Sakamalio, affluent de la Manambolo (bassin du Mandrare), pentes rocailleuses (gneiss), 500-800 m, fl., 12.1933 (BR, G, K, P, TAN).

## **HUMBERTIELLA** sect. **VERECUNDA** Dorr, *sect. nov.*

*Fructus calyce erecto absconditus.*

TYPE-SPECIES : *Humbertiella foliosa* (Hochr. & Humbert) Dorr.

### **6. Humbertiella foliosa** (Hochr. & Humbert) Dorr, *comb. nov.* — Fig. 3.

*Neohumbertiella foliosa* HOCHR. & HUMBERT, *Candollea* 12 : 183, *fig. 5* (1949); HOCHR., *Fl. Madag.* 129 : 117, *tab. 28, figs 7-9* (1955). Type : *Decary 13263* (lecto-, here designated, P; isolecto-, G-fragment, K, MO, TAN).

Small trees or shrubs; branches terete, new growth olive-green, densely stellate-pubescent, in age blackish with small white lenticular dots, glabrate. Lower leaf surfaces, petioles, stipules, and pedicels densely stellate-pubescent. Leaves borne on new growth, ascending; leaf blades ovate to elliptic, 1-4 cm long, 0.8-3.5 cm broad, apex acute to rounded, base obtuse to slightly cordate, margins entire, midvein and primary veins conspicuous below, upper surface sparsely pubescent, the arms of the (3-)7-rayed stellate hairs ascending, lower surface densely pubescent with 7-10-rayed stellate hairs; petioles shorter than the leaf blades, 0.5-1.5 cm long, becoming somewhat glabrate with age, but retaining simple and stellate hairs below and towards the leaf base; stipules acicular, ca. 1 mm long, extremely caducous.



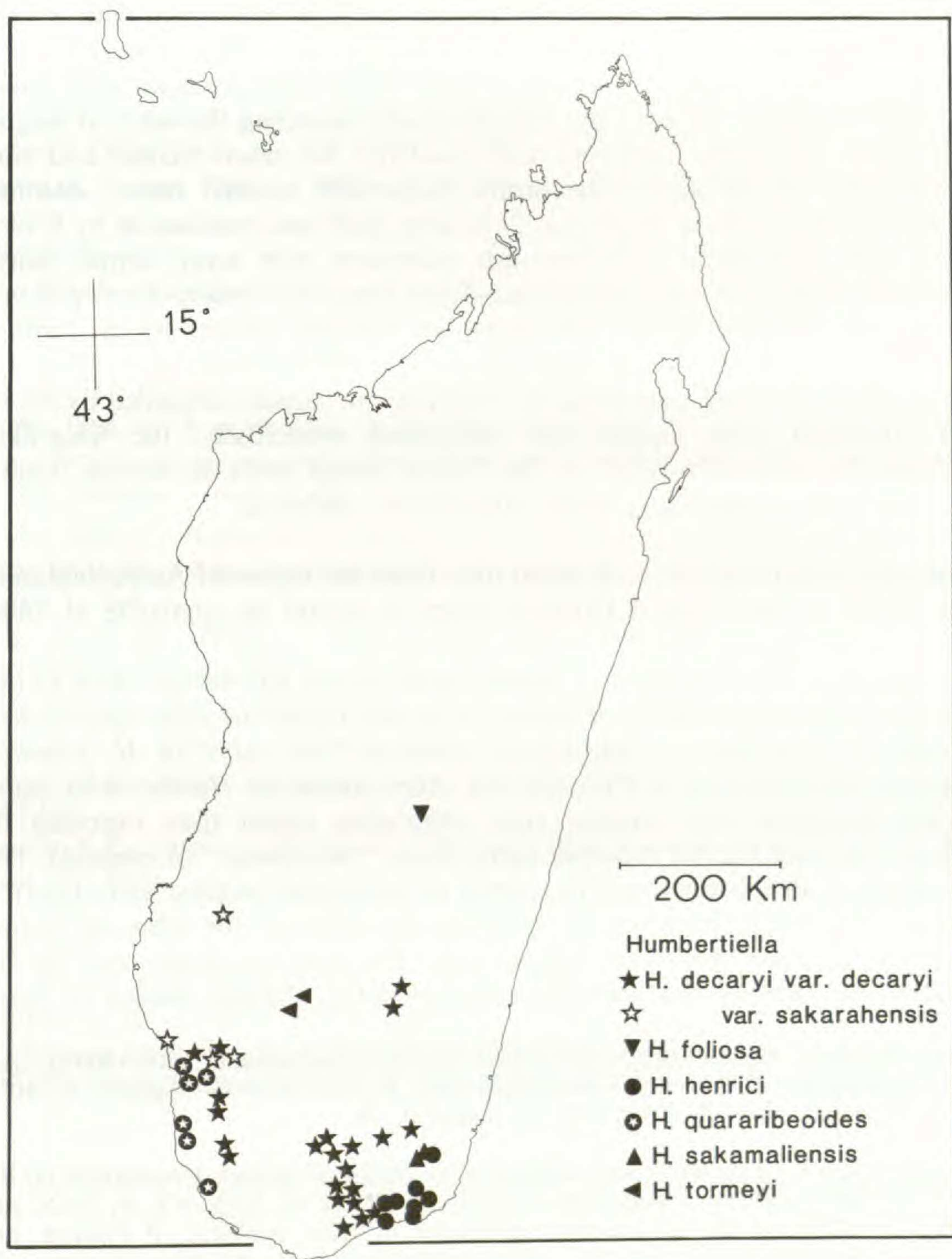


Fig. 4. — Distribution of species of *Humbertiella* in Madagascar.



Flowers solitary in the axils of subtending leaves, but clustered together near the apex of the new growth; pedicels 0.5-1 cm long at anthesis; involucre of 10 (-11) bracts; bracts gamophyllous below, lanceolate, acuminate, unequal in length, 0.5-1.2 cm long, erect, abaxially pubescent with multi-armed hairs, adaxially lanate; calyx in bud ovoid with a long beak, at anthesis 1.8-2.5 cm long, united one-third its length, the lobes triangular to narrowly triangular, the lobe bases 0.3-0.4 cm broad, weakly ribbed (the principal veins raised). Petals violet, red-violet, or pink, 1.5-2 cm long, conspicuously exceeding the calyx in length, 0.8-1 cm broad at the apex, externally pubescent with scattered 4-6 rayed stellate and simple hairs, internally pubescent on the claw with simple hairs with swollen bases; staminal column scarcely exceeding the corolla in length, ca. 2 cm long, glabrous, terminated by 5, ovate, fleshy, and papillate teeth ("coronule"), 2-3 mm tall, pubescent with waxy, simple hairs; stamens borne immediately below the apex, filaments 3-4 mm long, in 2 weakly-developed whorls of 15 stamens total; style branches free, 5, exceeding the staminal column by ca. 3 mm, glabrous; carpels 5.

Fruit 5-8 mm in diameter, composed of 5 obpyriform carpels concealed by the erect calyx, calyx lobes 10-16 mm long, carpels first separating septicidally, the wing-like vascular projection from the columella equal to the lateral carpel walls in outline, later dehiscing loculicidally (but not completely); seeds obpyriform, glabrous.

DISTRIBUTION AND ECOLOGY. — Known only from the region of Ambatofinandrahana on the western slopes of the Central Domain where it occurs on quartzite at 1600-1800 m.

OBSERVATIONS. — The involucre of *Humbertiella foliosa* has almost twice as many bracts as the involucres of the other species of *Humbertiella* and unlike the other species the bracts are united at their base to form a cupuliform structure. The calyx of *H. foliosa*, although membranaceous and reticulate in fruit like the other species of *Humbertiella*, appears to be somewhat less accrescent and remains erect concealing rather than exposing the mature carpels. (This is the basis for the sectional name, from "*verecundus*" or bashful). The shape of the mature carpels is also distinctive. The carpels are somewhat angular and obpyriform rather than spherical. The elaboration of the teeth at the apex of the staminal column is less conspicuous than in some species of *Humbertiella*. The teeth are fleshy, and the stamens are grouped below the apex of the staminal column that is slightly dilated at that point.

MATERIAL STUDIED : *Decary 13195*, environs d'Ambatofinandrahana, 1600-1800 m, quartzites, fl., 21.2.1938 (G-fragment, P); *Decary 13263* (lectotype), *ibid.*, fl., 23.2.1938 (G-fragment, K, MO, P, TAN); *Decary 13274* (syntype), *ibid.*, fl., 23.2.1938 (G-fragment, P).

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## REFERENCES CITED

- BAKER, H. G., 1948. — Corolla-size in gynodioecious and gynomonoecious species of flowering plants. *Proc. Leeds Philos. Soc., Sci. Ser.* 1948 : 136-139.
- BORSSUM WAALKES, J. van, 1966. — Malesian *Malvaceae* revised. *Blumea* 14 : 1-213.
- DORR, L. J., 1990. — A revision of the North American genus *Callirhoe* (*Malvaceae*). *Mem. New York Bot. Gard.* 56 : 1-75.
- EDLIN, H. L., 1935a. — A critical revision of certain taxonomic groups of the *Malvales*. *New Phytol.* 34 (1) : 1-20.
- EDLIN, H. L., 1935b. — A critical revision of certain taxonomic groups of the *Malvales*. Part II. *New Phytol.* 34 (2) : 122-143.
- FRYXELL, P. A., 1968. — A redefinition of the tribe *Gossypieae*. *Bot. Gaz.* 129 (4) : 296-308.
- FRYXELL, P. A., 1975. — Generic relationships of *Decaschistia* (*Malvaceae*) and the description of a new tribe, *Decaschistieae*. *Amer. J. Bot.* 62 (2) : 172-175.
- FRYXELL, P. A., 1988. — *Malvaceae* of Mexico. *Syst. Bot. Monogr.* 25 : 1-522.
- HOCHREUTINER, B. P. G., 1926a. — *Humbertiella*. Un genre nouveau de Malvacées de Madagascar. *Candollea* 3 : 1-4.
- HOCHREUTINER, B. P. G., 1926b. — Un nouveau genre, intermédiaire entre les Malvacées, les Bombacacées et les Sterculiacées. *Compt. Rend. Acad. Sci., Paris* 182 : 1485-1487.
- HOCHREUTINER, B. P. G., 1932. — Extension et affinités du genre *Humbertiella* Hochr. *Candollea* 5 : 1-4.
- HOCHREUTINER, B. P. G., 1940. — *Neohumbertiella*. Nouveau genre de Malvacées. *Candollea* 8 : 27-34.
- HOCHREUTINER, B. P. G., 1949. — *Malvales novae vel minus cognitae florae madagascariensis*. *Candollea* 12 : 163-186.
- HOCHREUTINER, B. P. G., 1955. — 129<sup>e</sup> Famille, Malvacées. *Flore de Madagascar et des Comores*. Firmin-Didot et C<sup>ie</sup>, Paris.
- HUTCHINSON, J., 1967. — *The genera of flowering plants (Angiospermae). Dicotyledones*. Vol. 2. Clarendon Press, Oxford.
- PERRIER DE LA BÂTHIE, H. & HOCHREUTINER, B. P. G., 1955. — 130<sup>e</sup> Famille, Bombacacées. *Flore de Madagascar et des Comores*. Firmin-Didot et C<sup>ie</sup>, Paris.
- PRESTING, D., STRAKA, H. & FRIEDRICH, B., 1983. — Palynologia Madagassica et Mascarenica. Familien 128 bis 146. *Tropische und subtropische Pflanzenwelt* 44 : 1-93.



